United States
Office of Personnel Management

FWS Job Grading Standard for

Aircraft Engine Mechanic

8602

TS-33, 9/74

Workforce Compensation and Performance Service
Classification Programs Division
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WORK COVERED

This standard covers nonsupervisory work involving the maintenance, trouble shooting, repair, overhaul, modification, and test of aircraft turbine and reciprocating engines. Work involving engine accessories such as starters, generators, anti-icers, and fuel control devices is covered by this standard when such assignments are incidental to work on the complete engine.

WORK NOT COVERED

This standard does not cover work that primarily involves:

- Maintenance and repair of fixed and rotary wing aircraft systems, airframes, components, and assemblies. (See Job Grading Standard for Aircraft Mechanic, 8852.)

- Maintenance and repair of hydraulic, pneumatic, oxygen, or fuel systems. (See Fluid Systems Job Family, 8200.)

- Maintenance and repair of liquid fuel rocket engines. (See Liquid Fuel Rocket Engine Series, 8675.)

- Maintenance and repair of starters, compressors, generators, or other ground support units. (See Job Grading Standard for Powered Support Systems Mechanic, 5378.)

TITLES

Jobs graded by this standard below the grade 10 are to be titled *Aircraft Engine Repairer*.
Jobs graded by this standard at the grade 10 and above are to be titled *Aircraft Engine Mechanic*.

GRADE LEVELS

This standard describes work at grades 8, 9, and 10. It does not describe all possible levels at which jobs may be established. If jobs differ substantially from the level of skill, knowledge, and other work requirements described in the grade levels of the standard, they may be graded at levels other than those described, based on the application of sound job grading methods.

HELPER AND INTERMEDIATE JOBS

Helper and Intermediate Aircraft Engine Mechanic jobs are graded by the Job Grading Standards for Trades Helper and Intermediate Jobs. (Grade-9 and grade-10 are to be used as the "journey level" in applying the Intermediate Job Grading Table depending on whether the target job is performing assembly or troubleshooting and repair.)

8602-8 AIRCRAFT ENGINE REPAIRER, GRADE 8 8602-8

General: Grade 8 aircraft engine repairers perform standard, routine disassembly and limited assembly operations of aircraft engines, engine assemblies, and accessories. Routine disassembly duties are performed independently. In accordance with procedures and requirements which are specified for each assignment, they examine, evaluate, recondition, and assemble subassemblies of limited variety such as assembling compressors or building up "hot" sections. Occasionally they may perform the full range of engine assembly under the direction of a higher grade aircraft engine repairer or mechanic.

Skill and Knowledge: Grade 8 aircraft engine repairers must:

- Have a knowledge of aircraft engine parts and components and an understanding of general mechanical systems and tools. Be able to disassemble aircraft engines and components, removing tubing, fuel controls, pumps, etc., from engines and breaking down major assemblies in proper sequence. Be able to determine if disassembled parts are reusable, recognizing scratches, burns, deformation, etc.

- Be knowledgeable of engine disassembly practices such as sequences of disassembly of engine or components to allow best use of tools, prevent damage to parts or injury to self, methods of freeing frozen or damaged parts and fastenings to prevent further damage to them or attached parts, or use of special disassembly jigs and tools to work efficiently.

- Have the ability to use measuring instruments such as spring balance scales, continuity checkers, go-no-go gages, squares, rules, and vernier calipers to check disassembled parts for defects such as warping, under or overweight, or for continuity of wiring harnesses, in order to route defective parts to repair or salvage.

- Have the ability to follow supervisor's oral instructions on disassembly sequences to follow and problem areas to watch for. Ability to interpret specification sheets when checking parts for damage or deterioration.

- Be able to detect wear patterns of engines or components which differ from those normally observed. Ability to visually estimate serviceability of disassembled parts in order to route for repair or discard. Ability to detect mismatched or misaligned parts as a possible cause of damage or malfunction.

Responsibility: Work is assigned orally and through work orders. Disassembly is performed independently in accordance with technical specifications and shop practices. Grade 8 repairers determine the proper tools and method to be used. The supervisor or other higher grade employees specify the procedures and technical requirements to follow for new assignments in assembly of components or subassemblies. Work is checked in process for compliance with instructions and specifications. The supervisor or other higher grade employee provides assistance on unusual problems.

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Physical Effort: Grade 8 aircraft engine repairers stand, stoop, bend, and reach. They frequently handle items weighing up to 5 kilograms (10 pounds) and often lift and carry assemblies weighing up to 23 kilograms (50 pounds). Hoists, hand trucks, lifts, and other employees are available to assist when handling heavy or awkward items. They may be required to climb steps and ladders and stand on slippery or inclined surfaces.

Working Conditions: Grade 8 aircraft engine repairers often work in clean, well lighted, and well ventilated production areas. They may work outside or inside in areas that are drafty and noisy, such as aircraft hangars. They stand on concrete or hard composition floors for long periods of time. They are frequently exposed to grease and solvents, to noise from drills and hammers, and to the possibility of cuts and abrasions from handling tools.

8602-9 AIRCRAFT ENGINE REPAIRER 8602-9

General: Grade 9 aircraft engine repairers perform the full range of engine assembly. They work on any of a variety of types of large and complex engines which are complicated due to the number of assemblies and accessory systems and requirement for adjustment to close tolerances. They assemble major components and accessories, such as compressor sections, rotors, combustion chambers, turbine wheels, and accessory drive gear boxes, and complete the final assembly build up of the total engine by installing accessories such as fuel regulators, ignition systems, and pumps. Duties are performed independently in accordance with specifications and technical directives. In comparison, grade 8 aircraft engine repairers disassemble engines and perform limited assembly operations, i.e., work on less complex subassemblies than those shown above or perform a few assignments such as shown above when they are specifically instructed in the operational routines to use whenever assignments change.

Skill and Knowledge: Grade 9 aircraft engine repairers must:

- Have a good knowledge of a variety of gas turbine or reciprocating aircraft engines and accessory systems. They must have a thorough knowledge of mechanical systems, including methods of shimming, scraping, and grinding in order to assemble parts to close tolerances, adjust and synchronize complex gear trains and control mechanisms, etc. In addition they must have a good knowledge of hydraulic, electric, and pneumatic systems to assure proper installation and operation of accessory systems such as those for fuel, lubrication, ignition, instrumentation, and anti-icing.

- Have a thorough knowledge of aircraft engine assembly practices in order to set up the work area when changing to a new assignment, select proper tools and assembly jigs to most efficiently and safely perform the operation, and adapt to new or modified assembly practices. They must be able to perform skilled assembly and adjustment tasks to achieve critical tolerances and measurements, for example, assembling compressor or turbine sections to assure proper clearance between rotor and stator portions, assuring proper clearances in main bearings to allow for heat expansion, or matching turbine nozzle vanes to assure required airflow.

- Be able to use measuring instruments common to the occupation such as micrometers and thickness and stretch gages to check used parts for deviation from original specifications and selection of matching parts, dynamic balancing machines to determine and correct imbalance of rotor assemblies, dial indicators to check and adjust end play of gears and rotors and measure vane openings when assembling jet engine nozzles, and torque wrenches to get required tension on bolts and fastenings.

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- Be able to use reference material such as job orders, work process sheets, technical manuals, and manufacturers manuals to determine sequence of work processes, positioning of parts, and critical tolerances used in assembly of major components and complete engines.

- Be able to diagnose problems such as locating nicks or burrs in machined surfaces which force assemblies out of alignment or improper size of bushings or bearings which prevent adjustment of gear backlash or introduce vibration in rotating assemblies, using such means as visual inspection or disassembly and measurement of parts.

Responsibility: Grade 9 aircraft engine repairers receive work assignments from the supervisor in the form of work orders accompanied by diagrams, and oral and written instructions which cover sequence of operations, critical dimensions, and unusual aspects of the job. The repairers are responsible for maintaining dimensions and tolerances to specifications. They determine the proper tools and methods to use. The supervisor is available to assist with unusual problems and to check completed work for conformance to specifications.

Physical Effort: Physical effort is similar to that described at grade 8.

Working Conditions: Working conditions are similar to those described at grade 8.

8602-10 AIRCRAFT ENGINE MECHANIC 8602-10

General: Grade 10 aircraft engine mechanics troubleshoot malfunctioning engines, determine the degree of disassembly needed, repair or replace defective parts, make prescribed modifications, and make final adjustments to achieve correct engine operation. They perform assignments such as troubleshooting and repairing operational engines in aircraft on the flightline, rebuilt or modified engines in test cells, or on the "penalty line" if correcting the defects will require extensive disassembly. Characteristic of work it this level is the need to consider the total engine system when troubleshooting or evaluating engine performance, since defects in one area often are shown by symptoms which appear in a different area. For example, improper combustion might be due to trouble in the combustion chamber, compressor, fuel control unit, air intake nozzle, or other areas. The mechanic is able to troubleshoot and repair or adjust the complete engine, including minor repair or replacement of attached electrical, pneumatic and fuel subsystems, engine controls and instrumentation. In comparison, grade 9 aircraft engine repairers assemble engines, achieving the correct settings, fits and tolerances according to prescribed specifications.

Skill and Knowledge: Grade 10 aircraft engine mechanics must:

- Have a thorough knowledge of the installation, operation and repair of gas turbine or reciprocating aircraft engines and accessory systems in order to maintain, repair, or test different types of engines in aircraft test, cells or maintenance shops, determine methods of repair to use, degree of disassembly necessary, and serviceability of parts or rework required before reassembly. They must be able to repair and rework engine parts and components and replace accessories such as portions of electrical, pneumatic, and hydraulic systems, reassembling, and trimming the unit to maximum operating capability. For example, they analyze such problems as fuel fluctuation, compressor instability, or excessive vibration and take remedial action, disassembling to the extent necessary to make needed corrections.

- Have a thorough knowledge of engine repair practices in order to identify and correctly choose between alternative methods and trade techniques, to adapt accepted repair procedures to new or unfamiliar engines or accessory systems, to anticipate that tools and parts will be required, and to set up the work area.

- Be skilled in the use of measuring instruments such as vibration analyzers to detect and locate the source of vibration in propellers, reduction gears, or engine rotors, pyrometers to check engine combustion, and test benches which read multiple parameters in oil, air vacuum, and torque.

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- Be skilled in the interpretation and use of technical orders, manufacturers catalogs, maintenance bulletins, etc. to obtain the technical information needed for troubleshooting, assembling and trimming engines, for instance, using conversion tables and graphs to convert observed data to standard day data, using technical orders and specifications to determine the sequence and tolerances for adjusting variable stator systems determining tolerances of turbine bearing parts when troubleshooting a vibration problem.

- Be able to troubleshoot engine malfunctions, including the ability to interpret trouble reports or observed instrument readings, appearance, etc., and make a tentative diagnosis, select needed tools, and test equipment and disassemble the engine or accessory systems to locate the defect, determine the cause of the defect, such as possible material failure, foreign objects, or incorrect assembly, and determine the repairs needed.

Responsibility: Grade 10 aircraft engine mechanics receive assignments orally or through work orders. They independently determine the type and extent of repairs needed and complete repairs with occasional spot checks during progress. They refer to operation logs, trouble reports, and technical manuals when locating and correcting defects and follow clearance and adjustment specifications found in technical manuals. The supervisor insures that overall work meets accepted trade standards and provides assistance on unusual problems when requested.

Physical Effort: Physical effort is similar to that described at grade 8.

Working Conditions: Working conditions are similar to those described at grade 8.